

Copy of the International Search Report

8 Sheets

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION <small>see Form PCT/ISA/220 as well as, where applicable, item 5 below.</small>	
International application No. PCT/GR2005/000010	International filing date (day/month/year) 12/04/2005	(Earliest) Priority Date (day/month/year) 27/04/2004
Applicant KARYAMBAS, Nicholas		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 5 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box II).

3. ☐ **Unity of invention is lacking** (see Box III).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

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6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 5

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GR2005/000010

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 F02C1/10 F03G7/10 B81B1/00 F03G7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 F02C F03G B81B G21K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 316 568 A (BROWN ET AL) 31 May 1994 (1994-05-31) column 2, line 15 - line 45 column 4, line 4 - column 6, line 45 column 9, line 59 - column 11, line 2 column 13, line 46 - column 14, line 29 abstract; figures 1-4, 18-21	1
X	US 2003/145593 A1 (GOLDENBLUM HAIM) 7 August 2003 (2003-08-07) paragraph '0064! - paragraph '0076! paragraph '0087! - paragraph '0092! paragraph '0100! paragraph '0104! - paragraph '0110! paragraph '0267! - paragraph '0276! abstract; figures 6a-6e ----- -/--	1



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

20 July 2005

Date of mailing of the international search report

28/07/2005

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

O'Shea, G

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GR2005/000010

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 2 533 622 A (GABRIELLI MICHEL) 30 March 1984 (1984-03-30) page 3, line 14 - page 5, line 11 abstract; figures -----	1
A	WO 94/20741 A (KIM, JAE, HWAN) 15 September 1994 (1994-09-15) page 9, line 4 - page 15, line 11 page 28, line 1 - page 30, line 1 abstract; figures 1-7,32,40-77 -----	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GR2005/000010

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5316568	A	31-05-1994	US 5395425 A	07-03-1995
US 2003145593	A1	07-08-2003	IL 119216 A	31-07-2003
			AU 4030497 A	14-04-1998
			GB 2352276 A , B	24-01-2001
			WO 9812712 A2	26-03-1998
			US 6167704 B1	02-01-2001
FR 2533622	A	30-03-1984	FR 2533622 A1	30-03-1984
WO 9420741	A	15-09-1994	AU 6116394 A	26-09-1994
			WO 9420741 A1	15-09-1994

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/GR2005/000010

International filing date (day/month/year)
12.04.2005

Priority date (day/month/year)
27.04.2004

International Patent Classification (IPC) or both national classification and IPC
F02C1/10, F03G7/10, B81B1/00, F03G7/00

Applicant
KARYAMBAS, Nicholas

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☐ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office - P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk - Pays Bas
Tel. +31 70 340 - 2040 Tx: 31 651 epo nl
Fax: +31 70 340 - 3016

Authorized Officer

O'Shea, G

Telephone No. +31 70 340-4424



**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

110287
International application No.
PCT/GR2005/000010

03/07/2005 08:02 2005

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
 INTERNATIONAL SEARCHING
 AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/GR2005/000010

Re Item V.

1. Reference is made to the following documents:
 D1: US-A-5 316 568 (BROWN ET AL) 31 May 1994
 D2: WO 94/20741 A (KIM, JAE, HWAN) 15 September 1994
2. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not inventive in the sense of Article 33(3) PCT. For the purposes of determining whether or not the subject-matter of claim 1 meets the requirements of the PCT, the wording of the claim has been interpreted as follows and for which Document D1 discloses (the references in parentheses applying to this document):

A device for converting thermal energy into kinetic energy (see figures 18 and 20), said device using a rarefied gas (col.14, lines 3-15) as the working fluid and comprising:

a vessel divided by a region (92) containing microscopic holes (12) with sizes comparable to the mean free path of the molecules (col.1, lines 26-28) of the gas, said microscopic holes having diverging inner surfaces (col.4, lines 41-44) and forming geometric shapes such as slots, cones or having segments of concave spherical surfaces (col.4, lines 44-53), said microscopic holes having a molecular layer adsorbed upon said inner walls (col.6, lines 34-45);

a gas turbine (96,104) which performs adiabatic expansion on the gas;

a heat exchanger (106) located downstream of the gas turbine (96,104) to provide heat energy to the gas flow.

The subject-matter of claim 1 therefore differs from this known device in that the heat exchanger transfers heat from the ambient air to the working fluid.

The provision of a heat exchanger to transfer heat energy from the ambient air to the working gas flow is well-known in the field of closed circuit turbines (see for example document D2, page 15, lines 2-11). The skilled person would therefore regard the use of such a heat exchanger in the device according to claim 1 as obvious and a matter of normal design procedure.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/GR2005/000010

3. Although the skilled person could produce a device having the features of claim 1, the description does not disclose the device in a manner which would enable it to work as described (Article 5 PCT). This leads to the claim not having industrial capability (Article 33(4)PCT)(see also PCT Guidelines 14.06). 4 ?